WHAT IS CLAIMED IS:

1. A constituent decoding method for decoding a turbo code, comprising the steps of:

(1) calculating the best and second best metrics of metrics being the sums of state metrics and a branch metric for a received information symbol in a turbo decoding trellis at an arbitrary time point during turbo decoding of the information symbol;

(2) calculating the difference between the best metric for the information symbol being 0 and the best metric for the information symbol being 1;

(3) calculating the difference between the second best metric for the information symbol being 0 and the second best metric for the information symbol being 1;

(4) calculating the difference between the best metric difference and the second best metric difference and multiplying the calculated difference by a weighting factor, so that the metrics being the sums of the state metrics and the branch metric are linear; and

(5) updating the log likelihood ratio (LLR) of the information symbol using the best metric difference obtained in the step of (2) and the product obtained in the step of (4) and deciding the value of the information symbol according to the updated LLR.

2. The constituent decoding method of claim 1, further comprising the step of ~~calcualting~~ calculating extrinsic information using the updated LLR, an input symbol reflecting SNR (Signal to Noise Ratio), and the a priori information of the input symbol after the step of (5).

3. The constituent decoding method of claim 1, wherein the weighting factor is determined by

$$\text{Weighting factor} = K \cdot W_f \quad \ldots\ldots(13)$$

where W_f is less than 1 and close to 1 and K is the mean inclination of ~~tagnet~~ tangent lines of a log function $l(x)=\log(1+e^{-x})$.

4. The constituent decoding method of claim 3, wherein W_f is greater than 0.588235.

5. The constituent decoding method of claim 1, wherein the weighting factor is derived from a function ~~linearized~~ linearized from a log function using the mean inclination of tangent lines of the log function, the log function being represented by the difference between the best metric and the second best metric.

6. The constituent decoding method of claim 3, wherein the mean inclination of the tangent lines is an integer between 0 and 9.

7. A constituent decoder for decoding a turbo code, comprising:

a first adder for calculating the difference between the best metric for a received information symbol being 1 and the best metric for the information symbol being 0 in a turbo decoding trellis at an arbitrary time point during turbo decoding the information symbol;

a second adder for adding the transmission information and a priori information of the information symbol;

a third adder for calculating the difference between the outputs of the first and second adders and outputting the difference as extrinsic information;

a first multiplier for multiplying the output of the third adder by a predetermined weighting factor as a feedback gain;

a correction value calculator for calculating a correction value using the difference between the best metric and second best metric of the received information symbol; and

a fourth adder for adding the correction value to the output of the first multiplier.

8. The constituent decoder of claim 7, wherein the correction value calculator comprises:

a fifth adder for calculating the difference between the best metric and the second best metric for the information symbol being 0;

a sixth adder for calculating the difference between the best metric and the second best metric for the information symbol being 1;

a look-up table for storing log function-based correction values for the outputs of the fifth and sixth adders and outputting correction values for the outputs of the fifth and sixth adders;

a seventh adder for calculating the difference between the correction values;

a second multiplier for multiplying the output of the seventh adder by a predetermined weighting factor;

an eighth adder for calculating the difference between the outputs of the fifth and sixth adders;

a third multiplier for multiplying the output of the eighth adder by the inclination of a linear function approximated from the log function; and

a selector for selecting one of the outputs of the second and third multipliers according to the reliability of the signal to noise ratio (SNR) of the received information symbol.

9. The constituent decoder of claim 8, wherein if the weighting factor and the inclination of the linear function can be expressed as 2's exponents, each of the multipliers is implemented as a bit selector.